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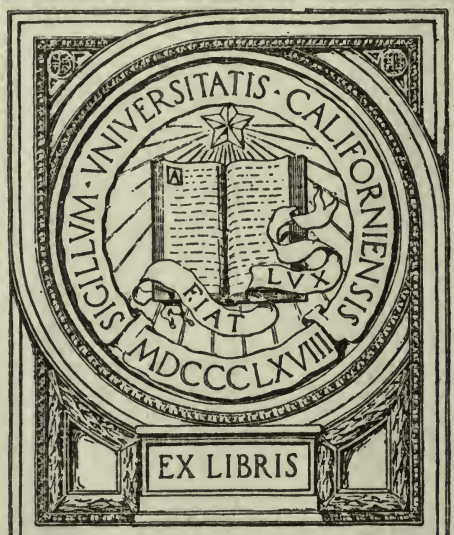

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WHAT IS THE RELATION OF ACADEMIC PREPARATION, EXPERIENCE, INTELLIGENCE, ACHIEVEMENT, AND SEX OF RURAL TEACHERS IN MISSISSIPPI TO THEIR PAY?

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BY
H. M. IVY, Ph. D.

GEORGE PEABODY COLLEGE FOR TEACHERS
CONTRIBUTIONS TO EDUCATION
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1922

Submitted in partial fulfillment of the
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in the Graduate School of Education of
George Peabody College for Teachers

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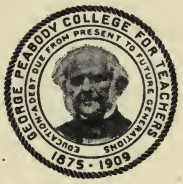

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CHAPTER I

THE PURPOSE AND SCOPE OF THE STUDY

The inequality of educational opportunity in the United States is nowhere more in evidence than in the contrast between that afforded the urban child and that afforded the rural child. The concentration of wealth in corporate bodies makes the taxes levied in cities for the support of education in large part indirect. In the rural community the school tax is direct. The farmer is not willing to pay high costs for schools unless he can see a direct value being returned. The teacher stands to him as a representative of what education can do for his boys and girls. Hence, the quality of rural education depends far more upon the quality of the teacher than does urban education. In general, the quality of any product is in proportion to the amount paid for it. This may be said to be true in regard to the rural teacher. If his salary is low, is his quality also low? In fixing his salary, what traits is society consciously and unconsciously seeking? We know and can measure some of these traits; others are known, but as yet unmeasured; still others are both unknown and unmeasured.

When the traits that affect the pay of the rural teacher have been ascertained, it will be possible to find the effect of each. With the effect known, the proper treatment may be applied that will result in a general improvement of rural salaries. It is in the hope of making a beginning along this line that this study was undertaken.

Coffman[1] made an exhaustive study of the social composition of the teaching population, in which he gathered data in regard to the training, experience, age, pay, et cetera, of rural, town, and city teachers in twenty-two states. Foght[2] collected data from most of the states in regard to sex, experience, salary, and preparation of rural teachers. Various state surveys which included the rural schools have been made, notably Washington,[3] Wyoming,[4] Arizona,[5] South Dakota,[6] and Nebraska.[7] Each of these studies is of great value and has done much to point the way to the solution of the rural school problem. In each, however, the data

[1]Social Composition of the Teaching Population, Teachers' College Contribution, No. 41.

[2]Efficiency and Preparation of Rural School Teachers, U. S. Bureau of Education, Bulletin 1914, No. 49.

[3]U. S. Bureau of Education, Bulletin 1916, No. 26.

[4]U. S. Bureau of Education, Bulletin 1916, No. 29.

[5]U. S. Bureau of Education, Bulletin 1917, No. 44.

[6]U. S. Bureau of Education, Bulletin 1918, No. 31.

[7]U. S. Bureau of Education, Bulletin 1919, No. 20.

were more objective than subjective, the individual equation of the teacher being scarcely touched.

The caption of this study, "What is the Relation of the Academic Preparation, Experience, Intelligence, Achievement, and Sex of Rural Teachers in Mississippi to Their Pay?" is intended to suggest its content. No claim is made that all of the factors entering into pay are considered, though it will be shown in Chapter IV that those included make up a significant number of them. What the others may be and the respective influence of each must be left for subsequent studies.

Intelligence tests are in wide use in dealing with children. They seem to have won their place as diagnostic and prognostic instruments in the hands of the trained school administrator. Their use in connection with the selection of teachers has been practically neglected, though experience with them in the army should indicate their applicability. One investigator states that "given enough intelligence to get through high school and two years of normal school, more does not function in a practical situation."[1] There is a possibility that he is right, but 66 per cent of the teachers[2] of the United States do not meet the requirement specified. Many normal schools are establishing their own norms[3] for future application to entrants, but it is still possible to become a teacher in thirty-five states without attending a normal.[4] Hence, an intelligence norm is needed below which no one should be permitted to attempt teaching.

Achievement tests are also in wide use with school children, and have proven their value to such an extent that the methods involved in their construction are beginning to be applied to remodel the time-worn examination questions. Teachers, however, still take the examinations made up from the questions given years ago and by industrious cramming secure a certificate. How do such teachers score when given the same tests that they are urged to give their pupils? The results are interesting and suggest some new problems for solution.

This investigation has undertaken to determine (1) whether practice takes into consideration in fixing the salary paid the rural teacher his academic preparation, experience, intelligence, achievement, and sex; (2) to arrive at a tentative minimum intelligence norm for rural teachers; (3) to determine the relative intelligence of those teachers

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[1]Knight, in Journal of Educational Research, Vol. 5, p. 213.

[2]Table showing report of data gathered by Carnegie Foundation, School and Society, Vol. 15, p. 304.

[3]Twenty-First Yearbook, Society for Study of Advancement of Education, Chapter 8.

[4]U. S. Bureau of Education, Bulletin 1921, No. 22.

who persist in the rural schools; (4) to ascertain whether the quality of the rural teacher as shown by intelligence and achievement is improving; and (5) to make a comparison of the male and female rural teacher.

The nature of the data requires that their treatment be statistical. The raw data will be first considered, after which the relationships of the various items will be ascertained. As practically all of the traits dealt with in education are complex and have interdependence—such as training, intelligence, and achievement—partial correlations will be used to hold some factors constant while the relationship of the others are found. In order to be certain that the items included in this study were not negligible factors in the pay of a teacher, multiple correlation was resorted to.

The conclusions arrived at in this study are limited to the "universe" from which the sampling was taken, and the figures and rates given, based on regression coefficients, apply only within the limits of this study.

CHAPTER II

METHODS USED TO OBTAIN THE DATA

A teacher who obtains a first-grade certificate in Mississippi is permitted to renew it yearly by attending a normal for six weeks and passing satisfactorily certain required courses. After teaching on such certificate for five years, it becomes a permanent one, and the teacher is exempt from further examination.

As one Normal College does not have adequate facilities for taking care of all those desiring to attend, local normals are established each summer at various places in the state. These normals are under the supervision of the State Department of Education, and give as far as possible the same courses that are given at the Normal College.

During the summer of 1921 there were fourteen of these provisional normals in operation. They were located[1] at Aberdeen, Benton, Clinton, College Hill, Corinth, Jackson, Meadville, Mendenhall, Meridian, Mize, New Albany, Slayden, Summit, and Wesson. Only one large section, known as the "Delta," had no normal located in it, as practically all of the teachers in this section come from counties outside of it.

Three thousand rural teachers were enrolled in these fourteen provisional normals and the Normal College (Hattiesburg) during the summer of 1921. Every county in the state except one was represented by one or more teachers. The exception is a county with a very small white population and employs only eighteen white teachers, practically all of whom are drawn from other counties.

A supply of questionnaires was sent to the directors of the summer normals, with instructions to have every teacher fill out one at the time of registration. On account of the unprecedented enrollment the supply of blanks was inadequate, and they were filled out by only 2,194 teachers.

The ten largest normals—Aberdeen, Clinton, College Hill, Corinth, Jackson, Hattiesburg, Meridian, New Albany, Slayden, and Wesson—were visited. At each the teachers were gathered into one large assembly room and given the Woody-McCall Mixed Fundamentals Test, Form 2; the Otis Intelligence Test, Advanced Examination, Forms A or B; and the Monroe Silent Reading Test No. 3, Form 2.

Before each test was given an explanation was made to the teachers as to its purpose. It was expected that as a

[1]These normals were open to white teachers only. Similar ones are held for the negro teachers, several of which were in the Delta.

result of taking the tests the teachers would become interested in them, learn more about their use, and try them out in their own schools the following session.

The time limit on the Woody-McCall test was reduced to ten minutes, as previous experience in giving that test had indicated that practically all of the children taking it had completed the work inside that limit. The papers written by the teachers showed that their scores were due to lack of accuracy rather than lack of time.

At Corinth it was necessary to divide the teachers into two groups on account of the lack of seating capacity. In order to comply with some local arrangements, it was necessary to curtail the time of the Otis test for the second group, which contained seventy-five teachers. This was done by omitting sections one and ten of the test. The scores were then transmuted according to the table given by Dr. Otis. (Manual for 1920.) Other than as suggested, the exact time limits were observed and full directions for giving and scoring each test were carried out. The examiners[1] were experienced in the work, and the teachers were in most cases anxious to try out the tests.

As has been stated, the questionnaire was filled out by 2,194 teachers. A few of the blanks were illegible, a few so incomplete as to be worthless. These, together with those filled out by individuals who could not be classified as rural teachers, were set aside. Altogether, 2,066 of these questionnaires were worked up.

Several failed to put their names on the Otis booklet, and a few quit after trying three or four tests. Altogether, 1,759 of these booklets were scored.

In the same way there were discrepancies among the reading and arithmetic papers that necessitated the discarding of some. The final tabulation showed 1,575 arithmetic scores and 1,472 reading scores.

When the questionnaires were checked with the tests, it was found that there were 1,265 teachers for whom there was a questionnaire and intelligence booklet; 966 of them had an arithmetic score, and 910 had reading scores. The tables in the following chapters are based upon these teachers.

[1]The arithmetic and reading tests were given by J. T. Calhoun, Supervisor of Rural Schools for Mississippi.

CHAPTER III

EXPOSITION OF THE DATA

The data gathered as indicated in Chapter II naturally fall into five groups: (1) academic preparation, (2) teaching experience, (3) intelligence, (4) achievement, (5) pay. They will be taken up in that order.

1. *Academic Preparation.*

The standard of preparation set for the rural teacher by the United States Bureau of Education[1] is graduation from a four-year high school, with two additional years in a normal school. That he falls short of this standard has been shown in practically every survey made.[2] That he is no exception in this regard in Mississippi is shown in the following table:

TABLE I

ACADEMIC PREPARATION OF RURAL TEACHERS

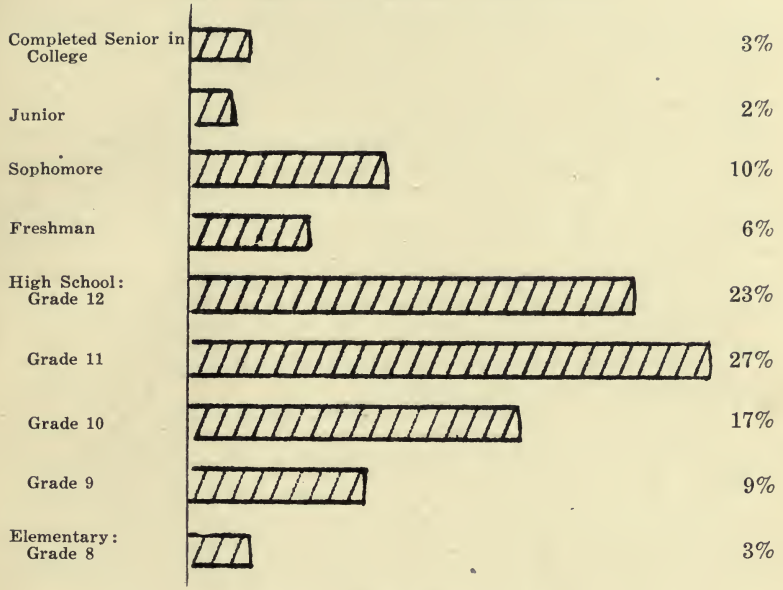
Grade or Class Completed	FEMALES			MALES			Total	Experienced Teachers	Novice Teachers
	Experienced	Novice	Total	Experienced	Novice	Total			
Senior (16)	14	5	19	10	2	12	31	24	7
Junior (15)	8	5	13	7	0	7	20	15	5
Sophomore (14)	59	28	87	18	10	28	115	77	38
Freshman (13)	41	19	60	7	3	10	70	48	22
Grade 12	147	90	237	31	17	48	285	178	107
Grade 11	195	93	286	25	18	43	331	220	111
Grade 10	139	37	176	29	9	38	214	168	46
Grade 9	69	23	92	8	6	14	106	77	29
Grade 8	20	5	25	3	2	5	30	23	7
Totals	693	305	997	138	67	205	1202	830	372
Q3	11.65	11.80	11.7	13[3]	11.9	12.57	11.83	11.73	11.8
M	10.6	10.95	10.71	11.13	10.92	11.05	10.76	10.67	10.93
Q1	9.6	10.12	9.75	9.81	9.97	9.85	9.77	9.64	10.1
Q	1.02	.83	.98	1.61	.96	1.36	1.03	1.04	.85

[1]Foght, in United States Bulletin No. 49, 1914.

[2]Carnegie Foundation Report, School and Society, Vol. 16, p. 304. Educational Conditions in Arizona, Bureau of Education, Bulletin 1917, No. 44; 1916, No. 29; 1919, No. 20.

[3]Used to indicate freshman year.

GRAPH SHOWING ACADEMIC PREPARATION



Explanation of Table I

The first column shows the grade in school or class in college which was completed. Column two shows the number of experienced female teachers who completed the grade or class indicated in the corresponding row of column one. For example, 14 female teachers had completed the senior year in college. At the bottom of the table are shown the 75, 50, and 25 percentiles and Q the semi-interquartile range. The graph below the table shows the comparison between the male and female teachers by percentages.

The range of preparation is from the eighth grade through the senior year in college, with the mode at the eleventh grade. From the graph it is readily seen that the high schools are producing the rural teachers, as 50 per cent of the entire number come from the three and four-year schools. The percentage who have completed the elementary grades only is too large (3 per cent), and will probably lose ground rapidly, as many of these teachers obtained their certificates during the war or were in the ranks before the certificate requirements were increased in 1916.

That 21 per cent of these teachers have had some college training may be attributed to the rapid spread of consolidation, which tends to hold such teachers in the rural school instead of seeking the towns, as they did before it began.

The predominance of those with sophomore college training is probably due to the influence of the Normal College, as its diploma graduates were given that rating.

A comparison of the experienced female teacher with the novice (a novice is one having a certificate to teach, but without teaching experience) shows that there is an increase in the amount of academic training on the part of the latter. The semi-interquartile range is also smaller with the novices, which, taken into consideration with the 25 percentile, shows that the incoming female teacher has had more schooling than her predecessor.

The same comparison with the male teachers shows that the experienced ones have had more training than the novices, though Q is again smaller for the novices, which indicates that there is a tendency toward increase in the amount of schooling before attempting to teach.

There seems to be very little difference in the preparation of the novice males and females; but the experienced males seem to have had more training than the females, this difference appearing chiefly in the upper quartile. This may be due to higher requirements being demanded of principals of consolidated schools, who are generally men. Coffman[1] found that women in the rural schools had had, on an average, one more year of training than the men.

Grouping the experienced teachers and comparing them with the novices indicates that the median novice has received approximately one-fourth of a year (two months) more training than the median experienced teacher.[2] This might be taken as an indication that the quality of academic preparation is gradually approaching the national standard, but the question arises: "May not the increase be due to the better prepared teachers quitting after a year or two?" The answer to this question is discussed in Chapter IV in connection with the correlation of preparation and experience.

2. *Experience.*

The rapid "turn-over" in the teaching force contributes much of the difficulty in organizing an educational system that will produce the optimum citizenship. This "turn-over" is more rapid in the rural schools than in those of any other class. Evenden[3] found the median experience for urban teachers to be seven and one-half terms, while the Nebraska Survey[4] found the median experience for rural

[1]Social Composition of the Teaching Population.
[2]If allowance were made for the training received by experienced teachers after beginning to teach, the novices would show up still better.
[3]Teachers' Salaries and Salary Schedules.
[4]Rural Teacher of Nebraska, United States Bulletin 1919, No. 20.

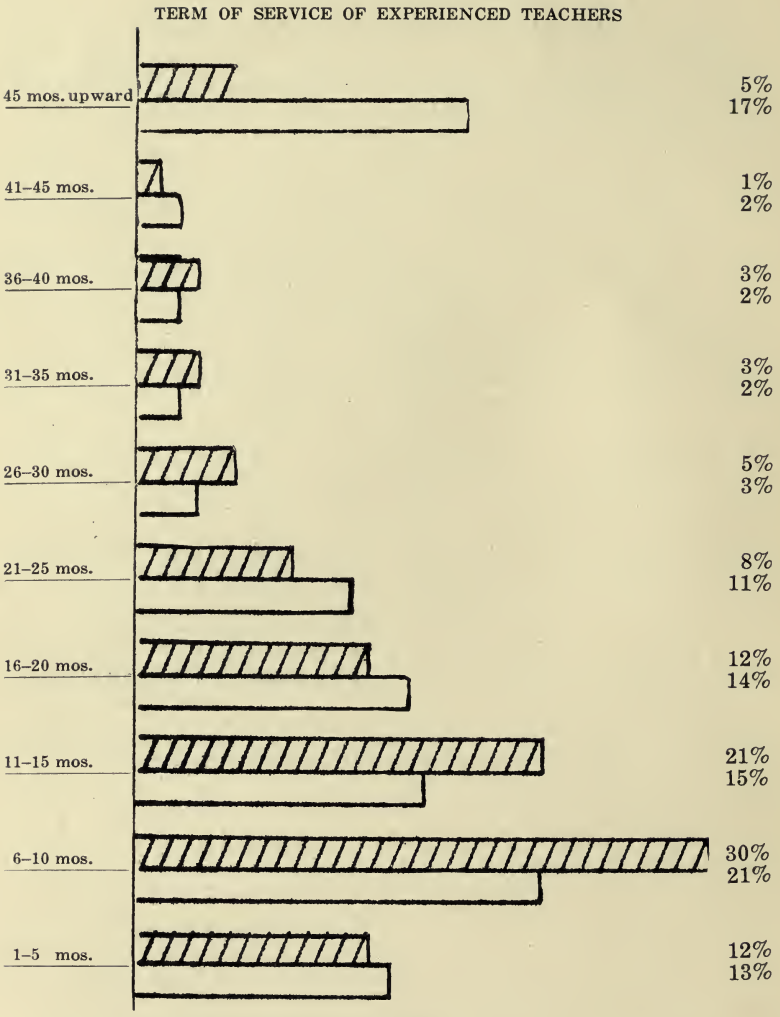
teachers in that state in 1914-1915 to be 1.85 terms or 16.28 months.

The experience of the rural teachers of Mississippi is shown in the following table:

TABLE II

TEACHING EXPERIENCE IN MONTHS OF RURAL TEACHERS

Number Months	Number of Females	Number of Males	Total
0 months	316	60	385
1–5	80	20	100
6–10	201	31	232
11–15	141	22	163
16–20	81	21	102
21–25	57	16	73
26–30	32	5	37
31–35	18	3	21
36–40	20	3	23
41–45	6	3	9
Over 45	37	26	63
Totals	989	219	1208
Q3	16.25	21.39	17.25
M	8.45	9.5	8.57
Q1	0 months	0 months	0 months
Q	8.13	10.69	8.63



Shaded bars represent percentage of females.
Open bars represent percentage of males.

Explanation of Table II

Column one shows the number of months of teaching experience the individuals have had. Column two shows the number of female teachers who have taught the number of months shown in the corresponding row of column one. For example, 316 female teachers had had no experience. At the bottom of the table are shown the 75, 50, and 25 per-

centiles and Q for each group. Beneath the table is a bar graph showing the percentages of male and female teachers who had taught for the number of months shown in the first column.

The range of experience is from no months to 180, all above 46 being thrown together into one interval. A rapid dwindling in numbers is evident after the 11–15 month interval among the females, while those for the males vary but little until the 21–25 month interval is passed.

The median for the females falls at 8.45 months and that for the males at 9.5. Of course the inclusion of the novices lowers these medians, but they show the experience of the median rural school-teacher at the beginning of the school year 1921-1922. With the novices eliminated, the medians become 13 and 17.5 months for the females and males, respectively. This, however, was their median experience at the end of the session, 1920-1921. A comparison of either set of medians indicates that the men persist longer than the women.

The stationary percentage of men from 26 to 46 months of service is probably the effect of the war in drawing away numbers of the younger men.

It is interesting to note that the percentage of male novices compared with experienced males is slightly larger than the percentage of novice females compared with experienced females. It may indicate a tendency for a larger proportion of men to become teachers.

With a median service of 13 and 17.5 months for the females and males, respectively, the terms must be limited to five or six months. The longer term in the consolidated school doubtless raises the medians.

3. *Intelligence.*

A great deal has been done during the last ten years in studying the intelligence of school children, but very little has been done with the teachers in that respect. Knight[1] tested a number of trained teachers in three city systems in Massachusetts, and concluded that "given enough intelligence to get through high school and two years of normal school, it was not a subsequent factor in teaching success." This statement is based on the teachers who are highly trained. Hence, it is not necessarily true in regard to rural teachers, a large proportion of whom have not even completed high school. Turner[2] obtained the Otis scores of 470

[1]Journal of Educational Research, Vol. 5, p. 213.

[2]A Study of the Intelligence of Four Hundred and Seventy Rural Teachers in Arkansas as Related to Their Certificates, Training, Experience, and Salary. (Unpublished.)

Arkansas teachers, most of them rural, and found a positive correlation between intelligence and training and intelligence and pay, but no definite relation between intelligence and experience. That there is an intelligence level below which none should be permitted to teach has been suggested by Miss Gambill,[1] and to that end the data of this section are suggestive.

The Otis Scale for General Intelligence, Advanced Examination, consists of ten tests, each of which contains from twenty to thirty questions. A time limit is assigned to each test. The whole may be completed within an hour. The highest possible score is 230 and the lowest is 0. Norms have been established for this scale for each chronological age from 8 to 18, at which age the norm becomes constant. The normal score for an adult is 130.

[1]Twenty-First Yearbook, National Society for the Study of Education, p. 238.

TABLE III

OTIS TEST SCORES—MISSISSIPPI TEACHERS

Scores	FEMALES			MALES			Total
	Experienced	Novice	Total	Experienced	Novice	Total	
211–215				1		1	1
206–210						0	0
201–205	3		3	1		1	4
196–200	1		1				1
191–195	1		1	2	1	3	4
186–190	9	1	10	2		2	12
181–185	10	4	14	2	2	4	18
176–180	14	4	18	4	1	5	23
171–175	12	2	14	3	1	4	18
166–170	24	7	31	2		2	33
161–165	19	4	23	6	2	8	31
156–160	33	5	38	2		2	40
151–155	47	15	62	5	4	9	71
146–150	31	17	48	11	1	12	60
141–145	44	20	64	4	3	7	71
136–140	50	22	72	12	5	17	89
131–135	48	17	65	12	5	17	82
126–130	49	26	75	12	7	19	94
121–125	62	25	87	15	9	24	111
116–120	37	26	63	8	1	9	72
111–115	36	23	59	12	3	15	74
106–110	43	17	60	6	2	8	68
101–105	35	16	51	4	3	7	58
96–100	34	22	56	6	2	8	64
91–95	19	10	29	10	5	15	44
86–90	12	12	24	2	3	5	29
81–85	13	9	22	3	1	4	26
76–80	8	7	15	2	3	5	20
71–75	5	3	8	1	1	2	10
66–70	7	3	10		2	2	12
61–65	6	4	10				10
56–60		2	2	1		1	3
51–55	1	2	3		1	1	4
46–50	3		3				3
41–45	2		2				2
36–40							0
31–35							0
26–30		3	3				3
Totals	718	328	1046	151	68	219	1265
Q3	150	133.5	146.15	147.5	139	145.93	145.98
M	129.7	121	127.07	127.3	123.9	126.79	127.04
Q1	114	105.5	107.21	111.1	97.5	102.81	108.08
Q	18	14	19.47	18	15.75	21.56	18.95

EXPLANATION OF TABLE III

The first column shows the scores made in the test. Column two shows the number of experienced female teachers making the score in the corresponding row of column one. For example, three experienced female teachers made scores

within the interval 201–205. At the bottom of the table are shown the 25, 50, and 75 percentiles and Q for each column.

The range of the scores is seen to be from 30 to 215, with the widest range shown by the female teachers.

The experienced female teachers have the best scores on comparison of the medians and quartiles. The experienced males follow, with the novice males third, and the novice females last. However, the novice females are bunched closer to their median score than the novice males, who drop below the female score at the lowest quartile. On comparing the sexes on the same points, indications are that the females are slightly better than the males. On comparing the experienced teachers with the novices, the former seem to be considerably better.

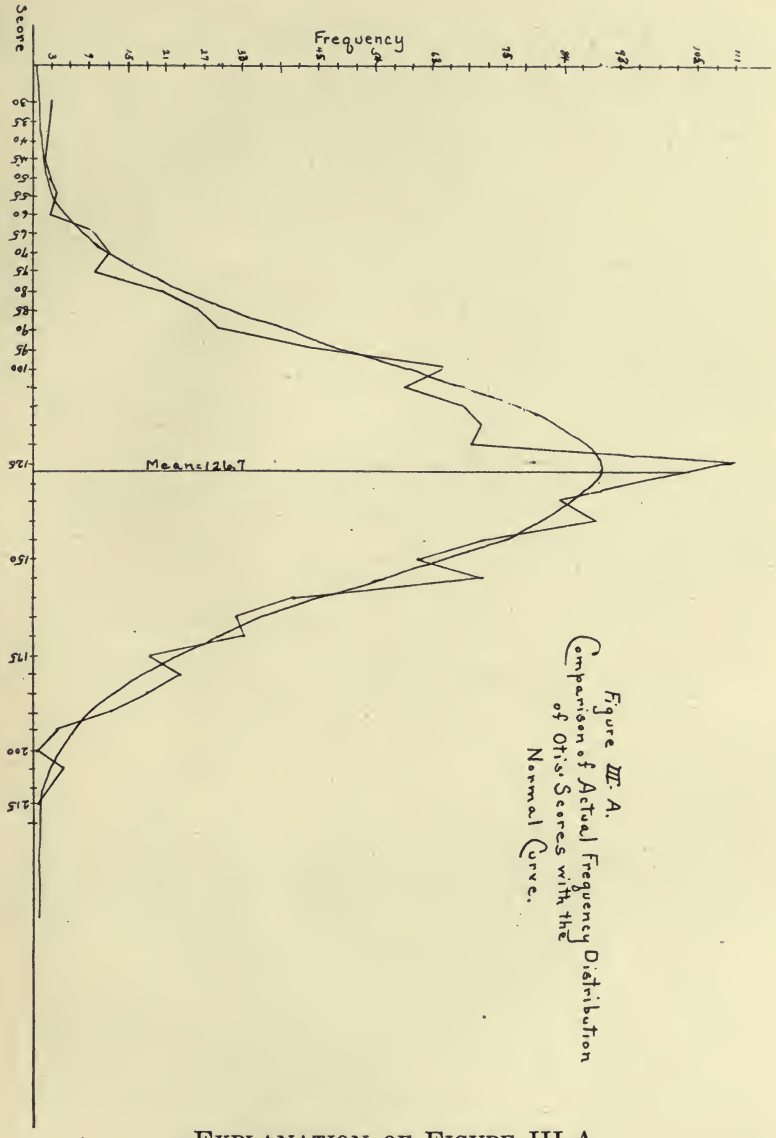


Figure III-A.
Comparison of Actual Frequency Distribution of Otis Scores with the Normal Curve.

Explanation of Figure III-A

This graph shows the comparison of the actual frequency diagram of the Otis scores with the normal frequency curve. The data on the actual frequency graph are taken from Table III, column eight. The scores are laid off on the base line and the frequency to the left. The normal curve

is superimposed by determining the ordinates in terms of sigma (5.704). (Table II in Rugg's Statistical Methods Applied to Education, page 388.)

In order to check the closeness of fit of the actual curve to the normal curve, the following formula[1] was used:

$$\text{Sigma of sampling} = \sqrt{\frac{f(N-f)}{N}}$$

Where f is the frequency at the point chosen on the normal curve, N is the number of cases in the whole distribution. The difference between the theoretical and actual frequency at any point must be less than three times the sigma of sampling if the distribution is normal.

In this curve the greatest difference apparent is at the apex of the curve. Substituting in the formula, we have:

$$\text{Sigma} = \sqrt{\frac{88.461\ (1265 - 88.461)}{1265}} = 9.08$$

Since the actual difference is $111 - 88.461 = 22.539$, the distribution is normal.

TABLE III-B

COMPARISON OF TEACHERS' SCORES WITH OTIS NORMS

Chronological Age	Norm[2]	PER CENT OF TEACHERS FALLING BELOW THAT NORM				
		FEMALES		MALES		Total
		Experienced	Novice	Experienced	Novice	
12 years	80	4.5	7.3	2.6	10.4	5.4
13 years	90	7.8	13.7	6	16.2	9.64
14 years	100	15.3	23.5	16.6	23.5	18.2
15 years	110	26.2	33.5	23.2	33.8	28.1
16 years	120	30.1	48.5	36.4	40	39.7
17 years	127	49.2	60	50	57.3	51.4
18 years	130	51.8	63.7	54.3	63.2	55.9

EXPLANATION OF TABLE III-B

Column one shows the chronological age; column two, the Otis norm corresponding to the age in the same row; and the remaining columns, the percentages of the respective groups of teachers falling below the norm in the corresponding row. For example, 4.5 per cent of the experienced female teachers scored below the Otis norm for twelve-year-old children.

The experienced teachers again show up as better than the novices. The suggestion here obtrudes itself that teaching experience may cause a higher test score through greater

[1]Rugg, Statistical Methods Applied to Education, p. 213.
[2]Otis Manual for 1921.

familiarity, but the correlation between the two is almost negligible, being .09 ± .026 for females and .125 ± .05 for males. (See Chapter IV, page 31.)

The female experienced teachers are slightly better than the males, though the males show smaller percentages below the 12, 13, and 14-year norms.

There is not much to choose between the novices, except that the males have a higher percentage of very low scores.

The most remarkable feature of the table is that 55.9 per cent of all the cases scored below the norm they should have attained. This condition is further accentuated when it is known that the compulsory education law compels the attendance of children up to their fifteenth birthday at schools in many of which the intelligence level of the child is above that of the teacher.

4. *Achievement.*

The achievement of teachers has been sought through examination as a means to ascertaining their proficiency in subject-matter. Few, if any, of these examinations have been in the nature of standardized tests in the subjects they were to teach. The following tables show the results of giving such tests to the rural teachers:

TABLE IV

WOODY-MCCALL TEST SCORES—MISSISSIPPI TEACHERS

Score	FEMALES			MALES			Total
	Experienced	Novice	Total	Experienced	Novice	Total	
34	22	1	23	10	0	10	33
33	26	2	28	5	2	7	35
32	41	8	49	9	1	10	59
31	48	17	65	6	1	7	72
30	49	16	65	10	6	16	81
29	44	19	63	17	5	22	85
28	59	19	78	8	3	11	89
27	43	18	61	6	1	7	68
26	40	20	60	11	6	17	77
25	45	23	68	6	4	10	78
24	41	25	66	4	2	6	72
23	28	18	46	4	2	6	52
22	29	18	47	1	2	3	50
21	17	11	28	4	2	6	34
20	14	13	27	1	2	3	30
19	8	8	16	1	0	1	17
18	8	7	15				15
17	2	6	8	2	2	4	12
16	1						1
15	1	3	4				4
14		1	1				1
13							0
12		1	1				1
Totals	566	254	820	105	41	146	966

Explanation of Table IV

Column one shows the score made in the Woody-McCall Mixed Fundamentals Arithmetic Test, Form 2. Column two shows the number of experienced female teachers who made the score in the corresponding row of the first column. For example, 22 experienced female teachers scored 34 in the test.

The range is greatest among the novice females, being from 12 to 34. The narrowest range is among the novice males, none of whom made a perfect score.

For easier analysis the following table is presented:

TABLE IV-A

Percentile Table for Woody-McCall Test

Percentile	Females		Males		8th Grade Norm[1]
	Experienced	Novice	Experienced	Novice	
High	34	34	34	33	34
90	32.8	31.2	33.9	31	31.8
80	31.5	29.6	32.3	30.3	30.6
70	30.3	28.3	30.8	29.5	30
60	29.1	26.9	29.9	28.5	29.3
50	28.1	25.7	28.3	26.7	28.4
40	26.8	24.6	28.2	26.1	26.9
30	25.5	23.5	25.9	25.1	25.1
20	24.1	22	25.7	23.1	23.4
10	22.2	20	23.4	21.1	20.6
Low	15	12	17	17	7

Explanation of Table IV-A

In the first column is shown the various percentiles from 10 to 90, with the high and low scores. Column two shows the score made by the experienced female teachers according to the percentile in the corresponding row of the first column. In the last column is given the eighth-grade norm. For example, the score below which 80 per cent of the experienced females came is 31.5, which is .9 more than the norm for the eighth grade.

The experienced females are above the norm, except for the 40 and 50 percentiles. The experienced males are well above the norm for each percentile, but not enough to indicate that the eighth-grade comparison is too low for them. The novices are below in every instance, with the novice females below the seventh-grade norm at the 40, 50, 60, and 70 percentiles.

[1]Bulletin No. 1, Bureau of Tests and Measurements, George Peabody College for Teachers.

These comparisons[1] indicate that the novice teachers are below the standard of achievement that their own pupils should attain and that the experienced teachers have barely attained it.

TABLE V

READING TEST SCORES—MISSISSIPPI TEACHERS—RATE

Scores	FEMALES			MALES			Total
	Experienced	Novice	Total	Experienced	Novice	Total	
151–154	4		4				4
146–150							0
141–145	63	17	80	8		8	88
136–140	1		1				1
131–135	34	14	48	11	4	15	63
126–130	3	1	4	2		2	6
121–125	99	53	152	18	9	27	179
116–120				1		1	1
111–115	3	2	5				5
106–110	99	53	152	22	8	30	182
101–105	3	1	4				4
96–100	6	0	6	2	0	2	8
91–95		3	3				3
86–90	110	51	161	18	11	29	190
81–85	3	0	3				3
76–80	59	32	91	11	4	15	106
71–75							0
66–70	17	9	26	8	3	11	37
61–65	3		3				3
56–60	2		2	1			3
51–55	4	5	9	2	1	3	12
46–50							0
41–45	3	1	4				4
36–40	2	1	3				3
31–35	2	1	3				3
26–30				1			1
21–25		2	2				2
Totals	520	246	766	105	40	145	911

EXPLANATION OF TABLE V

Column one shows the scores made in the rate of reading in the Monroe Silent Reading Test, Form 2, Test 3. Column two shows the number of experienced female teachers whose score fell in the class interval in the corresponding row of column one. For example, four experienced female teachers made a score between 151 and 155.

The range in rate of reading was from 25 to 155, with a distinct tendency to bunch scores in a few intervals. The highest scores were made by experienced females, with the novice females scoring the lowest.

The percentile table follows:

[1]Dr. McCall was consulted as to the comparability of these scores, since the teachers were limited to ten minutes instead of the usual twenty minutes. It is his opinion, as well as that of the examiners, that the teachers had exhausted their ability in that time. The papers show low scores due to errors rather than lack of time.

TABLE V-A

PERCENTILE TABLE, SILENT READING TEST—RATE

Percentile	FEMALES		MALES		12th Grade Norm[1]	11th Grade Norm[1]
	Experienced	Novice	Experienced	Novice		
95	144.8	142.4	142.5	133.5	147.9	140.4
90	142.2	133.3	134.8	131	139.2	134.1
80	127.7	124.4	126	123.8	130.7	125.8
70	123.4	122.1	123	121.6	123.5	109.8
60	111	110	110.5	110.8	107.5	104.1
50	108.3	107.7	108	107.1	102.3	89
40	98.5	90.8	97	89.6	87.6	84.3
30	88.8	88.4	88.2	87.8	83.1	79.6
20	85.4	81	79.7	86	77.5	73.1
10	77.6	77.1	69.5	76	69.6	61.9
5	68.9	67.2	66.8	67.7	59.8	54.7

EXPLANATION OF TABLE V-A

The first column shows the percentiles; the second, the score below which the corresponding per cent of the experienced females fell; and the last columns, the norms for the eleventh and twelfth grades. For example, 95 per cent of the experienced females scored below 144.8, whereas the corresponding score for the twelfth grade is 147.9.

A comparison of each group with the twelfth-grade norm shows that each is slightly better than the norm, though there are numerous fluctuations, particularly among the highest percentiles, where they more nearly approximate the eleventh-grade norm. This may indicate that the best readers do not choose teaching. However, the median schooling of these teachers is 10.93 grades; so they are not far off in their scores.

[1]Bulletin No. 5, Bureau of Educational Research, University of Illinois.

TABLE VI

READING TEST SCORES—MISSISSIPPI TEACHERS—COMPREHENSION

Score	FEMALES			MALES			Total
	Experienced	Novice	Total	Experienced	Novice	Total	
86–90	2		2				2
81–85				1		1	1
76–80	1		1		1	1	2
71–75	2	1	3		1	1	4
66–70	3	2	5	1		1	6
61–65	12	2	14	1		1	15
56–60	20	4	24	4		4	28
51–55	18	3	21	5	1	6	27
46–50	25	13	38	3	1	4	42
41–45	56	12	68	6	4	10	78
36–40	62	32	94	10	5	15	109
31–35	81	43	124	19	7	26	150
26–30	88	39	127	16	7	23	150
21–25	69	39	108	17	6	23	131
16–20	38	29	67	9	4	13	80
11–15	30	16	46	10	2	12	58
6–10	10	3	13	4	0	4	17
1–5	3	6	9	0	1	1	10
Totals	520	244	764	106	40	146	910

EXPLANATION OF TABLE VI

Column one shows the score in comprehension in the Monroe Silent Reading Test, Form 2, Test 3. Column two shows the number of experienced female teachers making a score in the class interval in the corresponding row of the first column. For example, two experienced female teachers scored between 86 and 90.

The range is from 5 to 90, with experienced female teachers making the highest score and greatest range.

These scores for each group are thrown into percentiles in the table below:

TABLE VI-A

PERCENTILE TABLE, SILENT READING TEST—COMPREHENSION

Percentile	FEMALES		MALES		11th Grade Norm	12th Grade Norm
	Experienced	Novice	Experienced	Novice		
95	59.5	50.9	58.1	56	56.3	58.9
90	52.7	46.4	52.4	48.5	49.7	51.8
80	44.1	39.1	40.9	41.0	42.9	43.6
70	39.6	35.5	35.8	37	38	39.7
60	35.6	32.7	33	33.9	33.1	35.9
50	32.4	29.5	30.9	31	29.4	32.1
40	29.3	26.3	26.7	28.2	25.9	28.4
30	26.4	23.2	23.6	25.2	22.8	24.9
20	22.7	19.8	20	21.8	19.9	20.3
10	17.2	15.2	14.3	17.25	15.1	16.1
5	12.2	12	11.7	13.5	11.3	12.6

Explanation of Table VI-A

The first column shows the percentile; the second, the score for experienced female teachers; the last two columns, the eleventh-grade and the twelfth-grade norms. For example, 95 per cent of the experienced female teachers scored below 59.5, which is .6 above the twelfth-grade norm.

This table shows that the experienced female teachers and the novice male teachers average up to the twelfth-grade norm, with the novice females and the experienced males almost a grade behind them. However, the lower percentiles show up consistently above the norm, with the upper percentiles below the norm.

5. *Pay.*

The pay received for services rendered has much to do with the quality of service. The Nebraska Survey[1] shows for two districts a median monthly salary paid to rural teachers in 1914-1915 of $47.69. The shortage of teachers incident to the war has raised salaries generally, though the following table shows that they are not yet munificent.:

[1]Rural Teacher of Nebraska, United States Bulletin 1919, No. 20.

TABLE VII

Pay of Mississippi Teachers

Monthly Salary	Females	Males	Totals
$246–250		1	1
241–245			0
236–240			0
231–235			0
226–230			0
221–225			0
216–220			0
211–215			0
206–210			0
201–205			0
196–200		3	3
191–195			0
186–190		1	1
181–185			0
176–180			0
171–175		4	4
166–170		1	1
161–165		1	1
156–160			0
151–155		1	1
146–150	2	20	22
141–145			0
136–140	1	1	2
131–135	1	4	5
126–130	1		1
121–125	9	20	29
116–120	4	1	5
111–115	5	1	6
106–110	4	3	7
101–105	1	2	3
96–100	48	22	70
91–95	14	3	17
86–90	47	13	60
81–85	49	13	62
76–80	66	10	76
71–75	152	10	162
66–70	90	7	97
61–65	123	11	134
56–60	110	6	116
51–55	45	1	46
46–50	41	4	45
41–45	8		8
36–40	22	2	24
31–35	1	1	2
Totals	844	167	1011
Q3	79.10	124.56	84.89
M	70.00	96.57	72.04
Q1	60.73	75.88	61.44
Q	9.18	10.28	11.73

Explanation of Table VII

Column one shows the monthly salary intervals and column two the number of female teachers receiving a salary within the interval in the corresponding row of column one. Column three shows the same for male teachers. At the bottom of the table are given the 25, 50, and 75 percentiles and Q.

The range of female salaries is from $35.00 per month to $150.00, with a very small percentage (3 1-3) above $100.00. There are two and one-half times as many who receive less than $50.00. With Q at $60.73, M at $70.00, Q3 at $79.10, and a semi-interquartile range of only $9.18, the financial returns to the woman rural teacher are fairly definitely fixed.

The range of male salaries is from $35.00 per month to $250.00. There is only one case at the upper limit, and the nearest cases to this one are at $200.00. The latter is possibly more nearly the maximum for rural male teachers. There seems to be a tendency for male salaries to increase by definite large units, as the distribution shows concentration at the $75.00, $100.00, $125.00, and $150.00 intervals. Approximately the same percentage (7.5) receive more than $150.00 as receive less than $60.00. Q shows that there is a variation of $10.18 from the median for the middle 50 per cent of the men.

A comparison of the medians shows that the male teacher receives 37.9 per cent more than the female teacher. Ninety-one per cent of the females do not attain the median male salary, while 81 per cent of the males exceed the median female salary.

A comparison of the 25 percentiles shows the male salary 24.95 per cent better than the female; the 75 percentile shows 21.92 per cent in favor of the male. The greatest difference is found between those falling within the middle 50 per cent.

TABLE VII-A

MONTHLY SALARY PERCENTILES—RURAL TEACHERS

Percentile	FEMALES		MALES	
	Salary	Increase	Salary	Increases
High	$150	61.3%	$250	67.1%
90	93	12.3	149.83	10.6
80	82.76	9	135.50	10.5
70	75.96	3.8	122.73	22.3
60	73.19	4.6	100.37	4
50	70	7	96.57	11.14
40	65.50	5.5	86.70	8.3
30	62.07	7.2	80.05	11.6
20	57.90	10.5	71.70	15.3
10	52.40	50	62.23	77.8
Low	35		35	

EXPLANATION OF TABLE VII-A

The first column shows the percentile; the second, the salary below which the per cent of females shown in the corresponding row of the first column fell; the third column, the percentage increase each percentile salary is over the next lowest.

The rate of increase is erratic for both males and females, but is consistently larger for the males than for the females, except at the 60 and 90 percentiles. The percentage increase for the women tends to decrease steadily until the 70 percentile is passed, when it begins to increase again.

SUMMARY OF CHAPTER III

1. *Academic Training.*—The median rural teacher has completed 10.76 grades in school. The experienced teachers lack two months of having as much preparation as the novices. Of all the teachers, 21 per cent have had some college training, 76 per cent have had some high-school training, 3 per cent have had no training beyond the elementary grades.

2. *Experience.*—The median rural teacher had at the close of the 1920-1921 session taught 13 months if female and 17.5 months if male. The rate of withdrawal from teaching is less among the men. The percentage of men persisting beyond 45 months is three and two-fifths times the percentage of women for that period. The percentage of men beginning to teach a second session in September, 1921, was slightly greater than that for women.

3. *Intelligence.*—The median rural teacher has an intelligence slightly below the norm for adults. The experienced female is practically normal, followed, respectively, by the

experienced male, the novice male, and the novice female. Eighteen and two-tenths per cent of all the teachers are below the normal score of a fourteen-year-old child, whom the compulsory education law compels to go to such teachers for instruction. The experienced teacher has a higher intelligence than the novice.

4. *Achievement.*—In the fundamental operations of arithmetic the experienced teachers approximate the eighth-grade norms, but the novices are barely up to the seventh-grade standard. The male teachers excel the females in their respective groups.

In reading rate, each group averages slightly better than the twelfth-grade norm, though the highest percentiles more nearly approximate the eleventh-grade norm. The experienced teachers are slightly better than the novices. The novice males are poorest.

In reading comprehension, the experienced teachers average up to the twelfth-grade norm, but the novices are almost a grade behind them. The lower percentiles show consistently above the norm, with the upper ones below it.

5. *Pay.*—The range of monthly salaries paid females is from $35.00 to $150.00, with the median at $70.00. The range of salaries paid male teachers is from $35.00 to $250.00, with the median at $96.57. Based on medians, the male teacher receives a 37.9 per cent higher salary than the female teacher. Ninety-one per cent of the female teachers do not attain the median salary paid the men, but 81 per cent of the men exceed the median salary paid the women. The initial salary paid women is lower than for the men, but in the highest percentiles the rate of increase of pay is approximately the same.

CHAPTER IV

Chapter III set forth the data showing as isolated items the academic preparation, experience, intelligence, achievement, and pay of rural teachers in Mississippi. This chapter (IV) will study the relation that each bears to the other. The first section of the chapter shows the relationships by means of total correlations; the second section uses the method of partial correlation; the third, that of multiple correlation.

SECTION 1—CORRELATIONS[1]

A positive correlation shows that as one variable increases, the other does also; while a negative correlation shows that as one variable increases, the other decreases. From 0 to .20 is considered a negligible correlation; from .35 to .50, marked; from .50 to .70, high; above .70, very high. The probable error indicates the amount of variation in the coefficient of correlation, as successive samples are drawn from the same universe. Within $\pm$ 1 probable error the probabilities are even (1 : 1) that r shows the true relationship; within $\pm$ 2 P. E. they are 4.5 to 1; within $\pm$ 3 P. E., 21 to 1; within $\pm$ 4 P. E., 142 to 1. Hence, a satisfactory degree of reliability requires that r be at least four times the P. E.

TABLE VIII

RAW CORRELATIONS OF FACTORS SHOWN

Females Shown Above Diagonal Line, Males Below

		Training	Experience	Intelligence	Arithmetic	Rate Reading	Comprehension Reading	Pay Per Month	Composite Achievement
Training	r	X	.2353	.2664	.090	.0638	.1285	.3828	.0861
	P. E.		.025	.0197	.025	.025	.025	.026	.026
Experience	r	.320	X	.0942	.2214	.0845	.1090	.3706	.2283
	P. E.	.050		.026	.02	.025	.025	.021	.0256
Intelligence	r	.376	.1256	X	X	X	X	.2405	.5061
	P. E.	.041	.05					.025	.020
Arithmetic	r	.205	.2389	X	X	X	X	.2049	X
	P. E.	.050	.0515					.027	
Rate Reading	r	—.027	.0017	X	X	X	X	.0578	X
	P. E.	.055	.05					.028	
Comprehension Reading	r	.048	—.1155	X	X	X	X	.1301	X
	P. E.	.055	.05					.027	
Pay per month	r	.5144	.3796	.3156	.2127	—.1232	—.0413	X	.1807
	P. E.	.04	.045	.05	.06	.06	.06		.026
Composite Achievement	r	.2463	.0573	.4595	X	X	X	.086	X
	P. E.	.060	.060	.049				.067	

[1]The tabular method of computing the correlation coefficient (r) is used throughout. See Rugg's Statistical Methods Applied to Education, p. 263.

Explanation of Table VIII

Correlations for female teachers are shown above the diagonal; males, below.

To find r for training and intelligence of females, locate the intersection of the row training with the intelligence column, where .2664 is found with its P. E. immediately beneath it. To find the one for the males, locate the intersection of the intelligence row with the training column, where .376 is found.

The Relation of Training to Experience.—The table (VIII) shows for women that $r = .235 \pm .025$; for men, $.32 \pm .05$. These are low correlations, but the probabilities are greater than 142 to 1 that teachers above the mean in training will be above the mean in term of service. The regressions show that each additional year given to training is accompanied by an increase of 2½ months in term of service for the women and 5 months for men. This indicates that a law requiring the completion of high school and two years of normal-school training before beginning to teach would tend to increase the term of service of women from 8.45 months to 16.75 months; for men, from 9.5 to 23.5 months.

The Relation of Training to Intelligence.—For women r ($.27 \pm .02$) is low, while that for men ($.38 \pm .04$) is marked. The regression of intelligence on training indicates that for each additional year of training the intelligence score for women is 5 higher; for men, 6¼ higher. If two years of normal-school training above high school were required before teaching, the probabilities are that the level of intelligence of the rural teacher would be raised from the present mean of 126.7 to above 140.

The regression of training on intelligence indicates that an increase of 60 in Otis score for women and 40 for men is accompanied by an increase of one year in training.

The Relation of Training to Arithmetic.—For men r ($.21 \pm .05$) is low, though much higher than for women ($.09 \pm .025$). This seems to verify the statement frequently made that males do better in arithmetic than females. The regression of arithmetic on training shows an increase of one problem in arithmetic, with an increase of 4 years in training for women and two for men; for training on arithmetic, an increase of 33 problems for women and 11 for men is accompanied by an increase of 1 year in training.

The Relation of Training to Reading Rate and Comprehension.—For each sex a very low correlation, with a correspondingly large probable error, is shown. This would

indicate that the relationship is too variable for reliability.

The Relation of Training to Composite Achievement.—For the women there is a very low positive correlation ($.086 \pm .026$), invalidated by a correspondingly large probable error; for the men there is a low correlation ($.246 \pm .06$). The regression of composite achievement on training indicates that for men one year and for women two years of additional training are accompanied by an increase in achievement of one-tenth sigma (2%).

The Relation of Training to Pay.—For women r ($.38 \pm .02$) is marked and for men ($.51 \pm .04$) may be called high. The regression of pay on training indicates that each additional year of training is accompanied by an increase in pay of $4 per month for women and $10 for men, while that of training on pay shows that an increase of $27 per month in pay for women and $40 for men is accompanied by an increase of one year in training.

The requirement of the completion of high school and two years of normal-school training should raise the average pay of women from $70 per month to $82; for men, from $96.57 to $126.57.

The Relation of Experience to Intelligence.—For each sex a very low positive correlation (women, $.094 \pm .026$; men, $.13 \pm .05$) is rendered unreliable by a correspondingly large probable error. The tabulation shows a tendency for the high and low Otis scores to be eliminated as experience increases.

The Relation of Experience to Arithmetic.—There is a low positive correlation (women, $.22 \pm .02$; men, $.19 \pm .05$) for each sex. The regression of arithmetic on experience indicates that an increase of 30 in score for women and 3 for men is accompanied by an increase of 5 months in experience, while an increase of 1 1-5 months in experience for women and 30 months for men is attended by an increase of one problem in score.

The Relation of Experience to Reading Rate and Comprehension.—In each instance a very low r, tending to become negative for men, has a correspondingly large probable error, which renders the relationship unreliable. The indications seem to be that teaching does not improve the teacher's reading ability, or else better readers quit the rural school.

The Relation of Experience to Composite Achievement.—For women r shows a low ($.228 \pm .025$) positive relationship; while that for men is so small as to be negligible, even though the probable error did not render it unreliable. The regression of experience on achievement for women

indicates that an increase of six-tenths of sigma (12%) is accompanied by an increase of 5 months in experience, or 25 months' increase in experience by three-tenths of sigma (6%).

The Relation of Experience to Pay.—For each sex r shows a marked relationship between these two factors (women, .37 ± .02; men, .38 ± .045). The regression of pay on experience indicates that an increase of 30 months in experience for women and 20 months for men is accompanied by an increase of $10 per month in pay, while that of experience on pay shows for each $40 per month increase in pay there is for women an increase of 15 months' experience and 11 months for men.

The Relation of Intelligence to Composite Achievement.—There is a high correlation (.51 ± .02) for women and a marked one (.4595 ± .048) for men. The regression of composite achievement on intelligence indicates that an increase of 10 in Otis score is accompanied by an increase of seven-tenths sigma (14%) for women and one-tenth sigma (2%) for men, or an increase of sigma in achievement is accompanied by an increase in Otis score of 37 for women and 20 for men.

The Relation of Intelligence to Pay.—There is a low relationship for both sexes (.24 ± .025 for women and .3156 ± .05 for men). The regression of pay on intelligence shows that an increase in Otis score of 15 for women and 25 for men is accompanied by an increase of $10 per month in pay; or an increase of $25 per month in pay for women and $80 for men is accompanied by an increase of 20 in Otis score. Apparently the effect of intelligence on pay is greater with the women than with the men.

The Relation of Arithmetic Score to Pay.—There is a low positive relationship for both sexes, though the large probable error tends to invalidate that of men. The regression of pay on arithmetic shows that an increase in score of 6 for women and 3 for men is accompanied by an increase of $5 per month in pay, or an increase of $20 per month in pay for women and $35 for men is accompanied by an increase of one in arithmetic score.

The Relation of Reading Rate and Comprehension to Pay.—For both sexes the correlation is very low, tending to negative values for men. The size of the probable error renders them all unreliable, except comprehension for women. Apparently reading ability has little or no relationship to salary.

The Relation of Composite Achievement to Pay.—The relation for each sex is very low, that of men being rendered

unreliable by a large probable error. The regression of achievement on pay for women shows an increase of one-tenth sigma (2%) with an increase of $12.50 per month in pay; or an increase of $5 per month in pay with an increase of 1.25 sigma (25%). It is probable that employing a teacher at a higher salary tends to secure one better in achievement, but high achievement is recognized very little in fixing salary.

Section 2—Partial Correlations[1]

The first section of this chapter deals with the relationship existing between various pairs of factors as shown by means of total correlation. It has been brought out that such relationships may be affected by a factor included in both variables the relation of which to each variable may be found. For example, the relationship of training to achievement is affected by intelligence. We desire to know the relation of training to achievement with the effect of intelligence removed. This can be ascertained by considering only those cases in which intelligence is the same, but that process is too cumbersome. It can also be determined by the method of partial correlation when the total correlations of the three, or more, variables are known. The general formula for this process is given by Yule[2] as:

$$r_{12.34\ldots n} = \frac{r_{12\,34\ldots(n-1)} - r_{1n.34\ldots(n-1)}\, r_{2n.34\ldots(n-1)}}{\left(1 - r^2_{1n\,34\ldots(n-1)}\right)^{\frac{1}{2}} \left(1 - r^2_{2n.34\ldots(n-1)}\right)^{\frac{1}{2}}}$$

In order to find the relation of pay to training, with intelligence, experience, and achievement remaining constant, we have:

$$r_{51.234} = \frac{r_{51.23} - r_{54.23}\, r_{14.23}}{(1 - r^2_{54.23})^{\frac{1}{2}} (1 - r^2_{14.23})^{\frac{1}{2}}}$$

in which variable 5 is pay, 1 is academic preparation, 2 is experience, 3 is intelligence, and 4 is composite achievement.

By substituting the values given in Table VIII and making the required computations, we find the following relationships:

[1]Rosenow: An Analysis of Mental Abilities, Psychological Monographs, Vol. 24, No. 5.

[2]Introduction to the Theory of Statistics, p. 238.

TABLE IX

Partial Correlations

			Females	Males
r_{51}		Pay and training	.3828	.5144
	2	Pay–training, with experience constant	.3262	.443
	23	Pay–training, with experience and intelligence constant	.2852	.381
	234	Pay–training, with experience, intelligence, and achievement constant	.2859	.3914
r_{52}		Pay and experience	.3706	.3796
	1	Pay–experience, with training constant	.314	.266
	13	Pay–experience, with training and intelligence constant	.334	.268
	134	Pay–experience, with training, intelligence, and achievement constant	.2694	.2675
r_{53}		Pay and intelligence	.2405	.3156
	1	Pay–intelligence, with training constant	.154	.146
	12	Pay–intelligence, with training and experience constant	.152	.149
	124	Pay–intelligence, with training, experience, and achievement constant	.1197	.1869
r_{54}		Pay and achievement	.1807	.0812
	1	Pay–achievement, with training constant	.1582	—.0570
	12	Pay–achievement, with training and experience constant	.0975	—.0531
	123	Pay–achievement, with training, experience, and intelligence constant	.0228	—.1261
r_{23}		Experience and intelligence	.09	.13
	1	Experience–intelligence, with training constant	.0297	.0095
	14	Experience–intelligence, with training and achievement constant	—.0946	.0200
	145	Experience–intelligence, with training, achievement, and pay constant	—.1259	—.0377
r_{43}		Achievement and intelligence	.5061	.4595
	1	Achievement–intelligence, with training constant	.5064	.4076
	12	Achievement–intelligence, with training and experience constant	.5128	.4079

Explanation of Table IX

The total correlation of pay and training (r_{51}) is .3828 $\pm$ .026 for females and .5144 $\pm$ .04 for males. When the influence of experience on each of these factors is eliminated, the correlation is reduced to .326 for females and .443 for males. When the influence of experience and intelligence is eliminated, there is a further drop to .285 for females and .381 for males. Upon eliminating the influence of experience, intelligence, and achievement, there is a slight increase to .286 for females and .391 for males.

In the same way the influence of the other factors on pay and experience, pay and intelligence, pay and achievement, and experience and intelligence, is eliminated.

The relation of training to pay, with the other factors constant, is proportionately the same for both sexes.

The same is true with pay and experience, except that intelligence has a negative effect, which is larger with the females than the males.

The elimination of training reduces the relation between pay and intelligence; but when experience and achievement are held constant, they show a negative influence for males and positive for females.

The relation of pay to achievement is low in each sex, but is reduced almost to zero for the females and becomes unmistakably negative for the males, after training, intelligence, and experience are eliminated.

Experience and intelligence begin low and are rapidly reduced for both sexes to a negative relationship when training, achievement, and pay are held constant. The larger negative effect of achievement on males and the larger positive total relationship between experience and intelligence for males reduce the decisiveness of the negative value of the partial coefficient for them.

Achievement and intelligence begin with a marked correlation for both sexes. The elimination of the influence of training has very little effect with the female coefficient, but decreases the male. The further elimination of experience increases each coefficient slightly.

Using the formulas suggested by Yule,[1] the following regressions are found:

$$X_5 = .58X_1 + .25X_2 + .07X_3 + .01X_4 \text{ for females, and}$$
$$X_5 = 1.57X_1 + .33X_2 + .23X_3 - .12X_4 \text{ for males.}$$

X_5 represents pay; X_1, training; X_2, experience; X_3, intelligence; and X_4, achievement. For women, as X_1 increases one year, X_5 increases \$2.50 per month (for class intervals of one year in training and \$5 per month in pay and within the limits of this study). In the same way all of the other factors increase pay in proportion to their coefficients, except achievement in males, where a decrease occurs.

[1]Introduction to the Theory of Statistics.

Section 3—Multiple Correlation[1]

Having found the relation of academic preparation, experience, intelligence, and achievement to pay for each sex, the question naturally arises: "Do these items constitute an appreciable number of the factors that enter into the amount of salary paid?" In order to answer this question, we must resort to the method of multiple correlation.

The fundamental difference between partial and multiple correlation is that in partial correlation, with, for instance, five variables, the fundamental relation sought is between two variables, with the three others out or controlled; while in multiple correlation, with the same five factors involved, the fundamental relation sought would be between one variable and the remaining four used collectively. The symbols indicate this difference, as $r12.345$ means the correlation between 1 and 2 when 3, 4, and 5 are out; while the symbol $r1.2345$ (multiple) means the significance of the first variable (1) when 2, 3, 4, and 5 are used collectively with 1. The formula for finding multiple correlation with five variables is:

$$r1.2345 = \left(1 - (1 - r^2_{15})(1 - r^2_{14.5})(1 - r^2_{13.45})(1 - r^2_{12.345})\right)^{\frac{1}{2}}$$

This result can be checked by the use of the formula:

$$r1.2345 = \left(1 - (1 - r^2_{12})(1 - r^2_{13.2})(1 - r^2_{14.23})(1 - r^2_{15.234})\right)^{\frac{1}{2}}$$

The value of $r1.2345$ should, of course, be the same, using the two formulas.

In the partial correlation, if $r12.345$ approaches zero, then the total correlation of $r12$ shows increased dependence on the factors 3, 4, and 5, and loses significance as an indication. Conversely, if $r12.345$ approaches 1, then $r12$ shows increased independence of variables 3, 4, and 5, and increasing importance as an indication.

In the multiple correlation, if $r1.2345$ approaches zero, then there are some important factors unconsidered, and the ones used are not the most important causal factors. On the other hand, if $r1.2345$ approaches 1, as .85, .90, or .95, then most of the important factors are being considered, and the results as indicated by partials are significant. If all factors are considered, multiple correlation is 1.

On substituting in the above formula, the coefficient of multiple correlation for the females is found to be .498; for

[1]Rosenow: An Analysis of Mental Abilities, Psychological Monographs, Vol. 24, No. 5.

the males, .584. These coefficients indicate that the factors involved in this study are significant, but others as highly significant are not touched.

Summary of Chapter IV

1. *Total Correlations.*

Those teachers who have had the most schooling tend to longer terms of service. With equal schooling, men tend to teach longer than women.

There is a low correlation between amount of schooling and intelligence. Approximately one-third of those scoring below the norm for fourteen-year-old pupils are above the median in schooling, there being a larger proportion of men than women.

There is a negligible correlation for women and a low correlation for men between schooling and ability in the fundamental operations in arithmetic.

The reading rate and comprehension correlations with schooling are negligible for both sexes.

There is a marked correlation between schooling and pay for both sexes, higher for men. The regressions show that a man's pay increases with schooling two and one-half times as fast as that of women.

There is a negligible correlation between intelligence and experience for both sexes. One-fourth of the women and one-third of the men below the Otis fourteen-year norm are above the median in experience. The high and low Otis scores seem to quit teaching first.

There is a low correlation between experience and arithmetic ability for both sexes.

The correlations between experience and reading rate and experience and reading comprehension are negligible for both sexes, though tending to be negative for the males. Either teaching prevents further development in reading ability or the best readers do not teach.

There is a marked correlation between experience and pay for both sexes, but the increase is more rapid for the men.

Intelligence seems to have some effect on pay, though one-fifth of the women and one-fourth of the men below the fourteen-year norm are above the median in pay.

Achievement seems to have no effect on pay for either sex.

Training improves composite achievement for men, but experience has no effect. The opposite seems true for women.

There is a marked correlation between composite achieve-

ment and intelligence for both sexes, though 18.6 per cent of the women and 29.4 per cent of the men below the fourteen-year norm are above median in achievement.

2. *Partial Correlations.*

Pay and training have a low correlation for females and a marked one for males when experience, intelligence, and achievement are constant. The regressions show that pay increases almost three times as fast due to training for males as for females.

Pay and experience, with the other factors constant, have the same correlation coefficient for the two sexes (.27), and the regressions indicate a ratio of 3 to 4 in the rate of increase of pay due to experience in favor of the men.

Pay and intelligence, with the other factors constant, have a positive but negligible coefficient of correlation for both sexes. The regressions indicate that intelligence counts three times as much for the men as for the women.

Pay and achievement, with the other factors constant, have no relation for either sex, though the correlation coefficient for the males is fairly strong in the negative direction.

Experience and intelligence begin with a negligible coefficient of correlation for each sex, which decreases to a negative relationship when training, achievement, and pay are held constant. The negative relationship is stronger for females than for males.

Composite achievement and intelligence begin with a marked correlation for each sex, the females some higher than the males. With the elimination of the influence of training and experience, the coefficient is increased slightly for the women and decreased for the men.

3. *Multiple Correlations.*

The factors involved in this study have a marked relation to pay, but others as highly significant are not touched.

CHAPTER V

SUMMARY AND CONCLUSIONS

1. *Summary.*

Chapter I states the purpose of the study as (1) to determine whether practice takes into account in fixing the salary of the rural teacher in Mississippi his academic preparation, experience, intelligence, achievement, and sex; (2) to arrive at a tentative minimum intelligence norm for rural teachers; (3) to determine the relative intelligence of those teachers who persist in the rural schools; (4) to ascertain whether the quality of the rural teacher as shown by intelligence and achievement is improving; and (5) to make a comparison of the male and female rural teacher.

Chapter II describes how the data were collected from the teachers assembled in the fifteen summer normals of Mississippi by questionnaire and testing.

Chapter III shows the data of the questionnaires and tests in tabular and graphic form. So far as possible, the data of each test are compared to standard norms.

Chapter IV indicates the relationship existing between every factor and each subsequent one. In order to remove the interdependence of the factors, partial correlation is used. To show that the factors included in the study are significant, multiple correlation is resorted to.

2. *Conclusions.*

In accordance with the analysis of the data as made in Chapters III and IV, it is believed that the following conclusions are justified:

1. Though the combined effect of training, experience, intelligence, achievement, and sex on pay is significant, as shown by the multiple correlation, there are other factors whose combined effect is probably of equal weight.
2. The pay of rural teachers increases with training, that of the men more rapidly.
3. The pay of rural teachers increases with experience, that of the men more rapidly.
4. Intelligence has little effect on the pay of men and less on the pay of women.
5. Achievement in arithmetic and reading has a negligible effect on the pay of women and tends to have a negative effect on the pay of men.
6. The median rural teacher is below normal in intelligence.

7. No novice should be permitted to teach who consistently makes an Otis score (or the equivalent on another scale) below 101.

8. As experience increases, intelligence tends to decrease. Apparently the most intelligent and the least intelligent teachers drop out earliest, leaving those of middle intelligence to persist. This tendency seems to be stronger among the women.

9. The quality of the rural teacher, as shown by intelligence and achievement, is not improving.

10. Teaching does not improve the teacher's reading ability.

11. If the classes in the schools from which rural teachers are drawn are normal in achievement, the best pupils do not teach.

12. The male rural teacher surpasses the female in training, experience, the fundamental operations of arithmetic, reading rate, and pay. The female surpasses the male in intelligence and reading comprehension.

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OTHER STUDIES SUGGESTED

1. To find all the factors upon which the pay of a rural teacher depends.
2. At what point in school training is the maximum of achievement in reading reached?
3. Does the best reader or computer make the best teacher of such subjects?
4. Does teaching rural pupils tend to decrease the teacher's reading comprehension through restriction of vocabulary?
5. Why is society willing to pay a male teacher more than a female?

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